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Chemical Use Standard Encoding System (ChemUSES)

Volume 1
Introduction and Instructions

DRAFT

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The Chemical Use Standard Encoding System (ChemUSES) provides a standard format and nomenclature for use in collecting and exchanging information about chemical uses. ChemUSES is a system for describing a chemical use by the function the chemical serves and the setting or application in which it serves that function. ChemUSES is composed of two lists of terms: The Function List and the Application List. Terms from these lists are selected to describe functions and applications. A use is defined when both the function and application are specified. (ChemUSES also includes user instructions and user aids.)

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CHEMICAL USE STANDARD ENCODING SYSTEM (ChemUSES)

Volume I — Introduction and Instructions

Final Report

July 1980

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DRAFT

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PREFACE

The purpose of the Chemical Use Standard Encoding System (ChemUSES) is to provide a standard format and nomenclature for use in collecting and exchanging information about chemical uses. ChemUSES is a system for describing a chemical use by the function the chemical serves and the setting or application in which it serves that function. For example, a chemical use could be described as a solvent (function) in paints (application). ChemUSES thus consists of a list of function terms and a list of application terms. ChemUSES also includes user instructions and user aids.

ChemUSES is presented in four volumes:

I User Instructions
II Function List and Index
III Application List and Index
IV User Aids

Volume I describes the purposes of ChemUSES and gives directions for using the system. Volume II presents a list of terms that describe chemical functions and an index to the function list. Volume III presents a list of terms for describing the products and activities in our economy that represent potential applications for chemicals. Volume III also includes an index to the applications list. Volume IV presents aids for using ChemUSES. These user aids consist of (1) a table that relates the ChemUSES application list to the SIC system, (2) a list of examples of application/function combinations, and (3) a list of function/application combinations.

Acknowledgements

ChemUSES was developed by the Environmental Protection Agency's Office of Pesticides and Toxic Substances. Mr. Steven L. Wilhelm was the EPA Technical Monitor for this study until 4 April 1980, when Mr. John N. Gevertz became the Technical Monitor. Mr. Wilhelm, Mr. Gevertz, and Mr. Jon J. Kaufman, all in the EPA Office of Pesticides and Toxic Substances, played an active role in the study. They defined the objectives of ChemUSES, contributed ideas for constructing the lists, identified sets of terms to be included, reviewed and commented on the work in progress, and prepared the introduction and instructions contained in this volume.

This study was conducted primarily in the Center for Resource and Environmental Systems Studies (CRESS) and the Chemical Industries Division (CID) of SRI International. Dr. Stephen L. Brown, Director of CRESS, was the project supervisor. Mr. Richard L. Goen, also of CRESS, was the project leader.

Dr. Eugene C. Coyner (CID) led the work on the Function List, the Function List Index, the chemicals section of the Application List, and the application/function combinations lists. Dr. Thomas Gibson (CID) also played a major role in those activities, and Mr. Arnold J. Millard (CID) participated in preparation of the Function List. Dr. Coyner and Dr. Gibson also contributed to the paper and petroleum sections of the Application List. Dr. Kirtland E. McCaleb and Ms. Janet R. Hardy both of CID, participated in development of the function index. Dr. McCaleb also participated in planning the study effort.

Mr. Goen and Dr. Robert V. Steele were primarily responsible for development of the Application List (exclusive of the chemicals section) and the application index. Several other SRI staff members who are experts on the industries represented in certain sections of the Application List also contributed to the development of those sections. In particular, Mr. James C. Croudace (Forest Products Industries Department) contributed to the sections on wood products and paper; Mr. Eugene Thiers (Minerals and Metals Center) to

the mining and metals section; Mr. Gerald Shroff (Mechanical and Electrical Industries Department) to the machinery and electrical and electronic equipment sections; and Mr. Philip D. Umholtz (Mechanical and Electrical Industries Department) to the transportation equipment section.

Dr. Oliver W. Whitby (Computer Science and Technology Division) led the data processing activities and developed the procedures for preparing the indexes. Mr. Robert L. Cofer (CRESS) conducted the initial programming and data file manipulation. Ms. Karen A. Suttinger (CRESS) performed the initial data entry. Ms. Reddy Dively (Computer Science and Technology Division) developed the format for the lists, edited the lists, and entered the data and changes. Mr. John F. Whitby (Computer Resources Group) developed special programs for the indexing and for generating check digits.

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Introduction

I. Purpose

The Toxic Substances Control Act (TSCA) [1], which became effective on January 1, 1977, gives the Environmental Protection Agency (EPA) responsibility for regulating chemical substances "whose manufacture, processing, distribution in commerce, use, or disposal may present an unreasonable risk of injury to health or the environment."

TSCA authorizes EPA to collect from manufacturers, importers, or processors of chemical substances certain types of data, including information on uses or use categories in which these chemical substances are employed. In order to carry out this mandate, the Agency has developed the Chemical Use Standard Encoding System (ChemUSES). ChemUSES provides a standard format and nomenclature for use in collecting and exchanging information about chemical uses.

The standard format and nomenclature provided by ChemUSES will enable EPA to make more efficient and effective use of the information it obtains. It will also aid EPA in meeting its TSCA responsibility of improving coordination between the several Federal agencies concerned with chemicals and health by facilitating computer storage and retrieval of use information.

II. History

EPA's development of a use classification system began prior to passage of TSCA in October 1976. The Agency carefully evaluated the ability of existing classification systems to classify information required under TSCA. Systems that were evaluated by the Agency include the following:

- Standard Industrial Classification Manual, Office of Management and Budget, 1972.
- Numerical List of Manufactured Produces, Bureau of the Census, 1973.
- Tariff Schedules of the U.S., Annotated, U.S. International Trade Commission, 1975.
- Schedule A--Commodities Imported into the U.S., Bureau of the Census, 1960.

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[1] 15 USC 2601 et.seg.

- Schedule B--Commodities Exported from the U.S., Bureau of the Census, 1971 (with revisions through 1975).
- Classified Index of Industries and Occupations, Bureau of the Census, 1971.
- U.S. Foreign Trade Statistics: Classifications and Cross-Classifications, 1974, Bureau of the Census.
- Standard International Trade Classification, Revised, United Nations, 1961.
- Nomenclature for the Classification of Goods in Customs Tariffs (Brussels Tariff Nomenclature), Customs Cooperation Council (Brussels), 1955.
- International Standard Industrial Classification of all Economic Activities, United Nations, 1968.
- Commodity Classification for Transporation Statistics, Office of Management and Budget, 1972.
- List of Materials Consumption Items, Bureau of the Census, 1972.
- Federal Supply Classification, Defense Supply Agency, 1975.

Although some systems were valuable in the development of ChemUSES, the Agency concluded that no single existing system could meet the special requirements for a use classification system to support TSCA. As a consequence EPA developed this classification system.

In the course of developing a use classification system the Agency published a Chemical Use List in the Federal Register[2] and solicited public comment on the applicability, utility, and technical merit of the some 850 use terms that were included in the List. Concerns expressed by EPA staff staff members and public comments received in response to publication led EPA to ask SRI International to evaluate the system. The results of this work were published by EPA in June 1979 as Report No. 560/12-79-007, "An Analysis of the EPA Chemical Use Classification System and the OTS Exposure Estimation Methodology."

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[2] 43 FR 32222, July 25, 1978

After reviewing this analysis and considering additional comments from a variety of sources, EPA decided that the concept of the Use List remained sound, but that considerable improvements were needed to make it into an effective tool for systematically classifying chemical uses.

The new ChemUSES is greatly changed. It consists of the following elements:

1. Function List with scope notes,
2. Index to the Function List,
3. Application List with scope notes,
4. Index to the Application List,
5. Table showing the relationships between the ChemUSES Application List and the SIC system,
6. List of functions associated with selected application terms,
7. List of applications associated with each function term.

III. Design and Philosophy

A complete and detailed description of a single chemical use could fill a small volume. Therefore, it is a challenging task to describe a chemical use adequately in a few words or phrases. For purposes of ChemUSES, "use" is defined in terms of two parameters, function and application.

The function of a chemical is described in a single word (or small group of words) which identifies the purpose the chemical serves. Examples are "solvents", "dyes", and "gelling agents." Similarly the application of a chemical is described by a single word (or small group of words) which identifies the setting in which the chemical is used. Examples are "dry cleaning operations", "industrial finishes", and "inks." A use is defined when both the function and application are specified.

ChemUSES is composed of two lists of terms: the Function List and the Application List. Terms from these lists are selected to describe functions and applications. This approach describes a chemical use simply and conforms to commonly accepted notions about the nature of chemical use information.

EPA sought to develop a system that could capture a level of detail consistent with the Agency's intended use. The two-parameter system will provide EPA with sufficiently detailed use descriptions at an affordable

development and maintenance cost. Such a scheme will also reduce the time and cost involved in reporting.

Most important, the two parameter system is easy to use. It was designed to be used by persons with limited technical expertise. This was necessary due to the variety of backgrounds and professions of the people who will use the system. Even in a two parameter system, there are some complications in selecting the appropriate function and application terms. Becoming familar with this system is the biggest difficulty to overcome. The two lists, their indexes, the other user aids, and the instructions will require some study. In designing the user aids and instructions every effort has been made to make the system easy to grasp and simple to use.

The Function List was developed in accordance with the following principles:

- o Structure
  - No hierarchy of terms
  - Terms not arranged in alphabetical order
  - Cross-references appear only in the index, not in the Function List
- o Uniqueness
  - Any function is referred to by only one term
  - Each term refers to only one function
- o Descriptions
  - Terms for functions applicable to a particular technology include a parenthetical expression identifying that technology
  - Scope notes describe the terms concisely, and if necessary for clarity, identify mechanisms of action or methods of application
  - Terms and scope notes use common industry terminology.

The absence of hierarchies in the Function List may help to prevent substitution of a more general term for a more specific term. It also makes the system less complicated. One reason for not arranging the terms in alphabetical order is to permit addition of new terms without changing the numbers of the old terms. The primary reason is to force the user to refer to the index and thus to examine the cross-references. Cross-references appear only in the index, to permit simplification of the instructions and easier and

more accurate use of the Function List. The only way to ensure that the most accurate function term is selected is to refer to the Function List Index.

The Function List contains 385 terms, including 46 terms designated as general terms. The general terms are intended for use only if an appropriate and more specific term is not available. The scope notes were developed to aid in making the terms conform with common industry terminology, and to eliminate ambiguity. They also clarify words that might be unfamiliar, by identifying mechanisms of action or methods of application when necessary.

The Function List Index contains extensive cross-references of the following three types:

(1) For all terms in the Function List: "See also" the related terms that are also in the list.

(2) For general terms in the Function List: "Use more specific term if appropriate," with a list of the specified terms.

(3) For terms not in the Function list: "See" related terms that are in the list.

In cross-references to a general function term, we replaced the number of the general term with the words "general term" so that the user would have to look it up in the index and thus be exposed to the related specific terms.

Index terms that are in the Function List have the initial letter capitalized; others do not. These terms can also be readily distinguished from the terms in the Function List by the absence of a function number.

The Application List is basically a new list, though it was derived in part from the Standard Industrial Classification Code (SIC). Like the SIC, the Application List is hierachically arranged. Many ChemUSES application terms have the same first two digits as related SIC terms. A detailed explanation of the correlation is presented in the user aid titled "Relationship of the ChemUSES Application List to the SIC Code."

The Application List describes the products and activities of our economy. The list provides a standard system for classifying the context in which chemicals are used. We developed the list with a hierarchical structure to provide a way of describing uses at the appropriate level of detail.

We included scope notes for terms, when it was necessary to clarify what the term encompasses. The Application List may be used sometimes without reference to the Index. Therefore, cross-references have been included in some of the scope notes to indicate the location of related terms.

During development of the system, it became obvious that each category could not appropriately contain the same number of levels. Because many related terms do not occur close to each other in the list, use of the Application List Index may be necessary in order to identify related terms. Reliance on the hierarchical nature of the Application List alone may lead to errors in describing uses.

Different kinds of hierarchical structures were developed for Application List categories. Three types of hierarchies can be distinguished:

(1) Product classes and products

(2) Basic products and converted products

(3) Products and activities.

Furniture is an example of a two-digit group that can be logically structured only by product class (e.g., office furniture) and product (e.g., desks). Paper products is an example of a group that divides into basic products and converted products. The basic products in the Paper sector are pulp, paper, and paperboard, with subclasses of products in each. The converted product group can be divided into converted paper products and converted paperboard products such as notebook paper and dress boxes. An example of a sector that logically divides into products and activities (or processes) is petroleum refining. Processes include distillation and catalytic cracking. Products include gasoline and jet fuel. In this and similar cases, the activities (or processes) cannot be uniquely associated with a single product. In most of the other manufacturing sectors, the "activity" is the manufacture of the product itself.

In some two-digit categories the SIC structure was largely followed, but other categories reflect substantial departures. In particular, an effort was made to avoid classifications that would permit listing a product in two or more different categories. The SIC system is structured by type of establishment, and frequently the same product may be produced in different types of establishments. For example, in the SIC, sweaters are listed under both Textile Mill Products and Apparel. We separated these categories into the two categories of (1) basic textiles and (2) apparel and other fabricated textile products.

The major use of chemicals is to make other chemicals and chemical products. Hence the chemicals section of the Applications List is of

particular importance, and special attention was devoted to the development of that part of the list.

The basic inorganic and organic chemicals presented the major difficulties in structuring the chemicals section. One problem was in specifying a clear distinction between organic and inorganic chemicals. Consideration was given to classifying all chemicals containing carbon as organic, in order to provide an unambiguous distinction. However, that classification rule would have led to classifying as organic compounds such as carbon dioxide and carbonates that are commonly considered inorganic. Therefore, all chemicals containing carbon were classified organic except those commonly considered inorganic. Exceptions are indicated in the scope note.

Another major problem was to develop a hierarchical structure for the basic chemicals that would provide a unique category for each chemical. To achieve that objective, basic organic chemicals were divided into the following composition categories: (1) hyrdrocarbons, (2) monofunctional organic compounds, (3) heterocycles, and (4) polyfunctional organic chemicals.

During development of ChemUSES, EPA came to realize that there was no practical limit to the detail involved in describing many applications. The application area of paints, for example, could be subdivided into dozens of different types of paints. These could be further subdivided according to method of application, type of pigment, etc. Eventually, continued subdivision becomes impractical. The Application List alone could easily have grown to more than 20,000 terms, and with cross-references and synonyms, the index to the Application List could have surpassed 100,000 entries.

However, the problem remained that chemical use information is very frequently known in finer detail than can be handled by a list of a few thousand terms. Nearly as often, this additional detail is useful or even critical to accurate and adequate understanding of chemical uses. To resolve this problem, EPA added a narrative section to ChemUSES. In this section, a respondent may submit a limited amount of narrative information in addition to the basic function/application description of a use. Use of narrative information is explained in detail in the Instructions section.

ChemUSES will never be complete. Each aspect of ChemUSES was designed to allow for potential expansion and improvement. Expansion of ChemUSES should not result in the addition of thousands of very detailed terms. Some new

terms, similar in detail to the current ones, may be necessary due to innovation in the chemical and allied industries, or due to initial oversights in developing ChemUSES.

Finally, it should be noted that the Function List and the Application List are not developed in certain areas, such as pesticides and cosmetics, which are not regulated under TSCA. Limited treatment of such areas appear in one or both of the lists, to serve the purpose of holding a place in the list as a "reserved" category. Should ChemUSES be adopted by other Federal agencies, as hoped, these sections will be expanded.

INSTRUCTIONS

This section contains descriptions of each of the components of ChemUSES and instructions for their use. The Function and Application Lists and their indexes are described first, followed by the user aids. Finally, specific instructions for developing chemical use descriptions are given.

A chemical use is defined as a combination of a function and an application. A chemical function is described in a single word or small groups of words which identifies the purpose the chemical serves. Examples are "solvents", "dyes" and "dust control agents". The application of a chemical is the activity or product in which the chemical is used. The application is also described by a single word or small group of words chosen from the terms on the Application List. Examples are "Inks", "Metal cans" and "Dry cleaning operations".

I. FUNCTIONS

A. The Function List and Scope Notes

The Function List contains 385 terms. The order of terms on the Function List is intentionally random. Each term on the list is followed by a scope note that contains explanatory or descriptive information. These scope notes are user aids, not technical definitions of terms.

The scope notes state whether a function term is one of the small number of general terms included. General terms are to be used only when a more specific description of the function or functions is not appropriate. Specific terms should be used for the most part, even if several such terms in a general category must be listed.

B. The Function List Index

The entries in the Function List Index consist of terms from the Function List, as well as referral or locator entries. Each term from the Function List appears in the index with its code number. For each valid function term, cross-references to related valid terms are given by "see also..." entries; e.g., "see also Sequestrants" appears after "Chelating agents." Synonyms and closely related terms that do not appear on the Function List may not be used as ChemUSES codes; they appear in the index to assist users in identifying valid function terms. Every non-valid term is followed by "see" and one or more cross-references to valid function terms, e.g., "see Film-forming Agents" is listed as a cross-reference under the synonym entry "Binders."

Index terms that are in the Function List have their initial letters capitalized. These terms also have a ChemUSES code number in the left margin. Non-valid terms are neither capitalized nor numbered.

When a general term appears on the Function List it is followed by the statement, "use more specific term if appropriate" and, then, the specific terms. When a general term appears as either a "see" or "see also" reference, it is followed by the phrase "general term" instead of the ChemUSES code number. The user should then refer to the general term in the index to note whether any of the specific terms listed under the general term are appropriate.

C. Selecting a Function Term

The function of the chemical should be expressed as one of the terms in the Function List. To use the Function List Index to select a valid function term, begin by identifying possible function descriptors in your own terminology. One or more of these terms should appear in the Index. If not, attempt to identify more specific or more general terms. Select the Index entry or entries that best match the function being described. Using the ChemUSES code numbers, look for valid terms on the Function List and use the scope notes to select the most appropriate term(s).

As an example, suppose that a respondent manufactures hydroxyethylcellulose to be used as a thickener in interior latex trade sale paints. The user examining the Function List Index to see if "Thickeners" is a valid function term, or whether a related term would better describe the chemical's function. If there are related terms, they should be listed under "Thickeners".

"Thickeners" is a valid function term and is assigned the number 272. Therefore, one can next look for the term in the numerically ordered Function List, and read the scope note. The user should also look up the related terms "Emulsifiers", "Gelling agents", "Thixotropic agents", and "Viscosity adjustors". Because the user knows that the chemical does not perform its function in textile technology there is no need to look up the related term "Vat printing assistants (textile technology)".

After examining the scope notes for all related terms, the user should choose the term which best describes the function the chemical serves. In this case, it may be assumed that "Thickeners" was the best term. The respondent should note both the Function term and its code number. This example will be continued in the section of the instructions which deals with selection of application terms.

II. APPLICATIONS

A. The Application List and Scope Notes

The Application List contains several thousand terms at five levels of hierarchical detail. Products, processes, and other activities are all potential applications.

The least specific level of hierarchy contains such broad terms as "Chemicals" and "Machinery." These terms will rarely, if ever, appear in use descriptions. They are included to clarify the organization of the list. Each of these categories is divided into several sub-categories which are then subdivided, and so on--up to a fifth level of hierarchy, when necessary--to reach an appropriate level of detail. Terms at the same level of the hierarchy, but at different locations in the list are not necessarily comparable in detail.

Many terms on the Application List are followed by scope notes that contain explanatory, descriptive or instructional material. In the majority of cases, the scope note is intended to clarify what the term encompasses and/or provide an illustrative list. None of the scope notes should be thought of as definitions or exhaustive lists. Some Application terms are self-explanatory and no scope note is provided. When selecting a term from the Application List, the most specific term available should be used rather than a less specific term.

The Application List is numbered by assigning two digits to each level of the hierarchy. Each pair of digits is separated from the next by a decimal point. For example, 04.03.02.01 denotes a term at the fourth level of hierarchy, and 04.03.02 denotes the less specific term at the third level. Care must be taken in transcribing the codes to ensure that digits are not inadvertently deleted or transposed.

To reduce the likelihood of transcription errors, a "check digit" has been added to the end of each code number. A check digit is a number which the computer can decipher to "check" for errors in transcribing code numbers. The check digit is preceeded by a hyphen. While the check digit does not reflect the Application List hierarchy, it is an intergral part of the code number and must not be left off when recording the number.

Many instances occur when a term or group of terms could be located in more than one place on the list. Such occurences are unavoidable due to the complexities and overlaps of industries, products, and processes. While

duplicative entries have been eliminated, closely related terms do not always appear in the same section of the list. Thus, use of the Application List Index is recommended to ensure that the most appropriate term is selected.

Application terms are basically of two types that may be called "products" and "activities". Products are generally items that can be purchased, such as "Laundry detergents," "Wire springs" or "Storage batteries". Activities are processes or services, such as "Automobile repair" or "Medical services". The distinction between these two types of terms is not always clear. First, all "product-type" Application terms have a dual meaning. They refer both to the product and to the activity of manufacturing or processing that product. In making "Steel castings" in foundaries one uses steel. The steel is incorporated in the final product. Thus, "Steel castings" refers to the product. However, other chemicals are used in foundry operations, such as binders for making sand casting molds. Such chemicals are not part of the final product, and thus are not used in steel castings in the same sense that steel is. In this case, the application term refers to the activity of <u>making</u> "Steel castings." In general, if a chemical is not intentionally incorporated in the end product to perform a function, it should be specified as serving in the activity.

An analogous situation exists for many "activity-type" terms. They may indicate either an activity or a product used in conducting that activity.

Whenever there might be some confusion regarding products or activities the user is requested to append an "A" to the Application term code number to designate an activity, or a "P" to designate a product. For example, "30.01.02-3P Tires and innertubes" implies that the application is in the product tires, whereas "30.01.02-3A Tires and innertubes" implies that the application refers to manufacturing tires. The need to make such distinctions should not arise often. It will usually be necessary when the user desires to specify whether or not the chemical substance is intentionally incorporated in the final product.

B. <u>The Application List Index</u>

The Application List Index contains valid terms from the Application List, as well as some common synonyms. Because of the length and hierarchical nature of the Application List, not all terms on the List appear on the Index. Terms that contain identical first words, or similar roots do not all

appear on the Index. For example, "Clothing" appears in the Index, but "Clothing, Men's" and "Clothing, Women's do not appear. This is because the entry "Clothing" refers the user to the section containing both men and women's clothing. However, "Men's clothing" and "Women's clothing" do appea in the Index.

C. Selecting an Application Term

The application of the chemical should be described by one or more of the terms in the Application List at as detailed a level of the hierarchy as possible. To find the appropriate term, look for potential descriptor terms in the Application List Index, and then find these terms on the Application List. It may be necessary to try a variety of descriptors to find the proper section of the list, and to examine all the scope notes in that section to determine the most appropriate term(s). Also, examine the sections of the Application List that contain cross-referenced terms and read any scope note provided. This should make selection of the most appropriate term straight forward.

Returning to the example used above, one can select an appropriate application term for the use of hydroxyethylcellulose as a thickener in paints. The user should first examine the Application List Index and check for paints. The user is referred to both "(39.06.03.02-0) Paints, artists" and "(28.08-6) Paints and Allied Products". Assuming the application is onl in "Paints and allied products", the user should then refer to section 28.08 of the Application List. If, however, the thickener is also used in Artist's paints, the user would be required to list both function and application combinations as separate use descriptions.

The "Paints and allied products" section contains a variety of sub-sections that must be examined in order to select the most accurate use description. First, one must choose (at the next level of hierarchy) between "(28.08.02.-7) Trade sales finishes" and "(28.08.02-2) Industrial finishes". In this example, "Trade sale finishes" is selected.

At the next level of detail, one must decide whether the Application is "(28.08.01.01.-8) Exterior trade sale finishes", or "(28.08.01.02.-9) Interior trade sale finishes". In this case, "Interior trade sale finishes" is selected.

Finally, one would specify the application term "(28.08.01.02.02-1) Water based interior paints and enamels". Additional detail may be provided by describing the application in the narrative section of the ChemUSES reporting form, as will be discussed later.

It is possible that the application may not be known to the level of detail described in the example. In these cases, the most specific Application description which conforms with the user's knowledge should be provided.

III. THE USER AIDS

To assist individuals in searching the function and application lists for appropriate terms, three user aids have been developed. The first, a parallel table relating the Standard Industrial Classification Code to the Application List, will be helpful for those familiar with the SIC system. The other user aids are lists of common uses which indicate frequently encountered combinations of functions and applications.

A. Relationship between the ChemUSES Application List and the SIC

The ChemUSES - SIC table is a simple parallel table that makes explicit the relationship between the Application List and SIC codes. While the Application List was developed in part from the SIC codes, many deviations from the general organization of the SIC system were necessary. Because many users are already familiar with the SIC system and are aware of the location of an industrial section in the SIC hierarchy, knowledge of SIC codes may be valuable in using the Application List.

The table is arranged by SIC codes and terms, which appear in the left column. In the right column appears information indicating where the industrial segment or its products may be located in the Application List. Because of its simple organization according to SIC code numbers, use of this table should be straight forward.

B. Application/Function and Function/Application Combinations

The purpose of the Application/Function and Function/Application lists is to provide a starting place for determining what kinds of chemical functions might be employed in a known application, or the converse. The two combination lists also serve as examples that illustrate how to employ ChemUSES to specify chemical uses.

Function terms are listed only for selected terms in the Application List. For our purposes, a comprehensive listing of combinations is not needed; nor would development of comprehensive lists be feasible. Many of the application terms in the same section of the list will have a common set of chemical functions. The Function/Application List is a list of all functions followed by one or more related applications. Returning to the previous example, the respondent may know that the chemical is used in paints, but does not know the proper ChemUSES term for the function this substance serves. By

locating "Paints and allied products" in the combination Application/Function list, a list of common functions that chemicals perform in paints can be examined. Because the combination list is arranged numerically, the user must first find the valid Application code number. By examining the listed function terms and comparing scope notes in the Function List, the user can select the appropriate function term.

If a user knows the function of the chemical, but not the proper ChemUSES Application term, a review of the Function/Application combination list should provide assistance.

IV. DEVELOPING A USE DESCRIPTION

This section provides specific guidance for building a use description by combining function and application terms, and adding narrative material where necessary. Instructions for handling simple cases are given first, followed by instructions for uses which are slightly more complicated. Finally, instructions for inclusion of narrative material are given. To understand this section, the user must have reviewed the material presented in the preceeding sections.

A. Basic Structure (F/A)

As noted in the Introduction, "use" is defined in ChemUSES as the function a chemical serves and the application in which it serves that function. The basic structure of a use description, is a function term preceded by its code number and an application term preceded by its code number. The two terms are separated by a slash. The example of methyl ethyl ketone used as a solvent in paints would appear as:

(271) Solvents/(28.08.01.02-9) Interior trade-sale finishes.

B. Function or Application Unknown

In some cases, a respondent will not know the setting in which a chemical is used. In many cases, the respondent will be able to make use of the less specific levels of hierarchy in the Application List. In cases where the application is completely unknown, the code "(98) Application Unknown" may be used.

It is less likely that a respondent will be unaware of the function a chemical serves. However, for such cases, ChemUSES includes the category "(980) Function Unknown."

C. Function or Application Not Found

Every effort has been taken to ensure that function and application terms are provided for all uses of chemicals. With careful examination of the indexes, appropriate terms should be found. However, should the respondent remain unable to locate appropriate terms, the categories "(990) Function Not Found" or "(99) Application Not Found" may be used.

If one of these categories is used, the respondent must also employ the

narrative section (specific instructions are provided in Part J below). The respondent should briefly describe the function or application in his/her own words. A brief indication of why existing terms did not seem appropriate is also suggested.

The EPA will review all narrative material accompanying functions or applications not found. The EPA may decide to add new terms or alter scope notes in future editions of ChemUSES.

D. Multiple Functions (F-F/A)

Occasionally, a chemical serves two or more purposes simultaneously in a product, or may serve any of several functions depending on its concentration or some other parameter. An example of the latter is sodium nitrite which at low concentrations serves as a preservative in meat products, but at higher concentrations can also serve as a color enhancer.

ChemUSES permits specification of multiple function terms. The function terms with their code numbers should be separated by hyphens. To use this format, the proper application term must be identical for all of the function terms. An example is the use of carbon black in automobile tires where it serves as a pigment and protects the rubber from ultraviolet degradation. This use would be described as follows:

> (125) Pigment - (36) Ultraviolet absorber/(30.01.02-3) Tires and inner tubes.

E. Multiple Applications - Different Uses (F/A, F/A)

Frequently a chemical serves the same purpose (function) in several applications. For purposes of ChemUSES these are considered separate uses and are coded separately. For example, acetone is a solvent in many applications such as paints, adhesives, and patching fillers. These uses would be coded as follows:

> (271) Solvent/(28.08-6) Paints and allied products
> (271) Solvent/(28.13.02.02-5) Synthetic organic adhesives
> (271) Solvent/(28.01.03.04-6)Extender pigments and fillers.

F. Multiple Applications: Activity-Product Combinations

In the nine sections of the Application List discussed below the user is instructed to combine two application terms; one which describes an activity and one which describes a product. The activity code number and term should be listed first followed by a hyphen, then the product code number and term. If a substance functions in more than one activity or with regard to more than one product, these uses should be coded separately.

In some instances, the user may know only that the substance functions in the activity and be unaware of the products involved. Similarily, the user may know only that a substance is involved in the production of one of the products discussed below, but be unaware of the activity or process involved. In these cases, the user should code only the known activity or product.

1. (10) Mining

In this section, one should specify an activity from "(10.07) Mining and related activities" and a product from the categories: "(10.01) Metallic ores"; "(10.02) Oil and gas"; "(10.04) Nonmetallic minerals"; or "(10.05) Construction minerals". For instance, xanthates serves as collectors in the beneficiation of zinc ore. This use would be coded as follows:

(283) Collectors/(10.07.04) Ore benefication - (10.01.04) Zinc ore.

2. (15) Construction

In this category one should choose an activity from "(15.03) Special construction activities", and, if appropriate, a product from "(15.01) Building construction" or "(15.02) Construction other than buildings". For instance, methyl borate serves as a flame-retardant in insulation for residential housing. This use would be coded as follows:

(332) Flame retardants/(15.03.07-5) Insulation-(15.01.01-7) Residential buildings.

3. (22) Textiles and Textile Finishing

In this category one should specify, when appropriate, an activity from "(22.03) Textile finishing and coating", and a product from "(22.01) Fiber and

fiber products", or "(22.02) Textile goods, n. e. c.". For instance, hexamethylene diamine serves as an antistatic agent in the finishing of man-made knit fabrics. This use would be coded as follows:

(328) Antistatic agents/(22.05.01.04-2) Chemical finishing n. e. c. - (22.01.04.03-0) Man-made knit fabrics.

4. (27) Printing and Publishing

In this category one should specify, when appropriate, an activity from "(27.02) Printing and related activities", and a product from "(27.01) Printed products". For instance, Yellow 12 serves as a toner in gravure printing of catalogues and directories. This use would be coded as follows:

(225) Toner/ (27.02.01.04-4) Gravure- (27.01.05-3) Catalogues and directories.

5. (30.02) Plastic Products

In this category one should specify, when appropriate, an activity from "(30.02.16) Plastics forming processes", and a product from sections (30.02.01) through (30.02.15) For example, carbon black serves as reinforcing agent in injection molded plastics. This use would be coded as follows:

(250) Reinforcing agents/(30.02.16.01-9) Injection molding - (30.02.02-4) Plastic rods, tubes and other stock shapes.

6. (34) Fabricated Metal Products

In this category, one should specify, when appropriate, an activity from "(34.09) Metal processing", and a product from sections (34.01) through (34.08). It might also be appropriate to select a product from sections such as "(37.01.01) Motor vehicles" or "(33.01.05.03) Steel castings". For example, zinc serves as a corrosion inhibitor in hot dip coated metals. This use would be coded as follows:

(323) Corrosion inhibitors/(34.09.05-8) Galvanizing and other hot dip coatings - (34.03.01-8) Fabricated structural metal.

4. (80) Building Applications

In this category one should specify, when appropriate, an activity from "(80.02) Building-related activities", and a product from "(80.01) Building categories". For instance, 1,2- dichloroethane serves as a degreaser in service station cleaning operations. This use would be coded as follows:

(229) Degreasers/(80.02.01-3) Cleaning - (80.01.05-6) Service stations and garages.

8. (32.01) Glass

In this category, one should specify, when appropriate, an activity from "(32.08.01.-4) Glass finishing", and a product from "(32.01.02-5) Flat glass", "(32.01.04-7) Glass containers", or "(32.02.05-8) Glassware". For example, Fe_2O_3 serves as a coloring agent in the staining of glass. This use would be coded as follows:

(86) Coloring agents/ (32.01.01.01-5) Chemical treatment- (32.01.02.03-8) Sheet glass.

9. (95) General Processes

The general process terms in this category describe activities that are not limited to a single industry, but are common to a number of industries. These terms should only be used if the activity cannot be accurately described in a specific section of the Application List, or if the respondent is only aware that the substance functions in the general process.

The terms should be used in combination with a particular application where specification of a process would help clarify the use of chemicals in the manufacture of a product. An example is magnesium perchlorate which serve as a dehydrating agent in the reactions of ethers. This use would be coded as follows:

(73) Dehydrating agents/(95.01.08-4) Reaction - (28.02.02.03-5) Ethers.

G. Specifying Product or Activity Applications (P or A)

As discussed above, it will occasionally be necessary to distinguish

between the product and activity meanings of an application term. Due to the existence of the sections described in Part F, only in a few cases should it be necessary to explicitly make the distinction. Most cases will be obvious.

The key element in making a distinction between product and activity hinges on whether or not the substance is intentionally incorporated in the final product. If a substance is used only in manufacture or processing and is not intentionally incorporated in the finished product, an "A" for activity may be specified. If the substance is intentionally incorporated in the finished product, a "P" should be specified. The A or P should be added to the use description following the code number (including check digit).

For example, parting agents are used in the manufacture of rubber tires. This use would be coded as follows:

(144) Parting agents/ (30.01.02-3A) Tires and Innertubes.

On the other hand, pigments are included in tires. This use would be coded as:

(125) Pigments/(30.01.02-3P) Tires and Innertubes.

H. Multiple Applications: Additional Application Terms

1. General discussion

Frequently, a use description may be improved by (an) additional application term(s) which serves to limit the scope of the application. For example, acetone is used as a solvent in special glues for making plywood. This would be described as follows:

(271) Solvents/(28.13.02.02.03-8) Synthetic organic adhesives - (24.03.01-8) Plywood veneer.

As the example indicates, the application terms are separated by hyphens. When multiple application terms are used, the function term may only be relevant to the first application. In this example, for instance, the solvent only functions in the adhesive. Function terms, applicable to each step in the application chain should not be strung together, but rather listed as separate use descriptions.

2. (30.02.07) Industrial Plastics Products

In one section of the Application List, the user is specifically instructed to use additional application terms. This is section "(30.02.07) Industrial plastics products" which includes four broad categories of applications such as housings and cabinetry, and mechanical components and parts. Additional application terms may be used to specify the industry segment involved. For example, acrylonitrile-butadiene-styrene is used as a raw material in the production of housings of car stereo equipment. This use would be coded as follows:

(224) Plastics for shaping/ (30.02.07.01-0) Plastic housings and cabinetry - (36.03.03.03-5) Audio components

I. (28) Chemicals and Allied Products

This section of the Application List contains two parts. The first is composition terms: "(28.01) Inorganic chemicals" and "(28.02) Organic chemicals". The second is end-use terms: (28.03) through (28.14). The end-use terms include categories, such as explosives and inks, and refer to end-products produced to meet specific performance characteristics. A chemical composition term refers to a specific molecular and elemental arrangement of atoms.

The composition section is used when a substance is used in the manufacture or processing of a chemical product or class of chemical products. The user may know, for example, that a substance is used in the manufacture of "(28.02.02.02) Acyclic hydrocarbons". If the specific acyclic hydrocarbon is known, the user must provide the IUPAC (International Union of Physicists and Chemists) name in the narrative section (described below), and must also provide the CAS (Chemical Abstracts Service) number. Whenever a specific chemical identity of an application is known, a CAS number must be provided if one has been assigned.

The end-use section is to be used if the particular chemical composition is not known, or if the substances functions in a wide-category of chemical products. For example, diphenylamine is used as a stabilizer in explosives. This use should be coded:

(54) Stabilizers/(28.11.04-3) High explosives

In cases where a composition term and an end-use term are both appropriate, the respondent must give both.

J. Use of Narrative Material

If the terms on the Function and Application Lists and the formats described above are inadequate, either because they fail to convey some critical detail or because they imply more than they should, narrative material may be appended to improve the overall use description.

One particular type of information that may be useful in a narrative is a product number from the Numerical List of Manufactured Products (NLMP) which is an extension of the SIC system to the product level. It contains nearly 20,000 specific product descriptors. Users of NLMP descriptors are required to use the code number for the product preceded by the acronym NLMP, e.g., NLMP 22---. Narrative descriptions of products are acceptable as well as NLMP codes. In the example of a paint thickener, for instance, the respondent may wish to write in the Narrative section NLMP 28514-11-5, to indicate that this thickener is used exclusively in flat interior latex trade sale paints.

As mentioned above, Category 28 of the Application List, "Chemicals and allied products" contains terms for describing applications in which chemicals are used in the manufacture or processing of other chemicals. The terms necessarily represent categories of chemicals. When using a term from this section of the Application List to refer to a specific chemical, the Chemical Abstract Service (CAS) number for the chemical must be supplied, if one has been assigned. If the CAS number is used, it should be prefaced by "CAS", i.e., CAS 7647-01-0. When no CAS number has been assigned, the IUPAC name of the chemical substance or substances must be specified. An example is magnesium bromide used as a catalyst in the production of methyl ethyl ketone. In the narrative section, the respondent would write:

Catalyst in production of Methyl ethyl ketone. CAS 78-93-3.

If users wish to describe the chemical use in their own words in addition to describing it with a function/application combination, they may do so in

the narrative section. However, the respondent must always provide a valid ChemUSES code.

If the valid ChemUSES code contains either the terms Function Unknown or Not Found, or Application Unknown or Not Found, respondents must deacribe the use in the narrative section.

ChemUSES Checklist

1. Examine Function List Index and record name and code number of candidate function terms.

2. Look for candidate terms by number in Function List. Read all scope notes and choose best valid function term(s).

3. Examine Application List Index. Record name and code number of candidate application terms. You may wish to refer to SIC - ChemUSES relationship table.

4. Examine relevant sections of Application List. Read all scope notes and choose appropriate terms. Provide as much detail as possible. Record selected term(s) and number(s).

5. Combine function and application terms as instructed.

6. If application is an identified chemical, write CAS number and IUPAC name in narrative section.

7. Describe the chemical use in your own words in the narrative section, if appropriate.

8. When necessary consult the combination lists for suggested function/application combinations.